

## Mobile Technology, putting the pieces together

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### Command Vehicle

2012 Ford F-150 SuperCrew Cab 4x4: In the spring of 2013 I purchased and set up a vehicle that I used specifically for Wildland Fires and Search & Rescue that is fully operational as a command vehicle. The truck is currently set up with a rugged laptop w/500gb solid state drive, 3G/4G Aircard linked to a wireless network through a CradlePoint router, a wireless printer and inverters to manage power needs. Software includes ArcMAP 10.2.2, Terrain Navigator Pro (OR), and many additional utilities that support GIS/GPS technologies.



### Hardware

- Computer(s): Dell Precision M2300 w/500nit screen for outdoor viewing & Dell ATG D630
- Gamber Johnson Mounts / FirstDock docking station
- Back-up Hard Drive. WD Passport 2TB Portable External USB 3.0 (NIFC BASE INFO)
- Hyper + Drive - iUSBport2 w/64GB SD card (WiFi 12 users)
- Printer: Wireless Multi Function Print/Scan/Copy
- Tablet: Apple iPad Mini 4G (Verizon)
- Tablet: Android, Google Nexus 7 – (WiFi)
- Pantech UML290 (Verizon 3G/4G Air Card)
- CradlePoint Wireless B/G/N , 4 Port Router
- Wilson 2G/3G/4G Multi Band Signal Booster
- 2 Additional Deep Cycle Batteries (isolated)
- 2 Power inverter, DC to AC
- Bendix King DPH Portable (w/software & cable)
- Bendix King GMH Mobile (w/software & cable)
- Garmin 76Map C (waterproof & floats)
- Multiple power points to keep devices charged.12v/ USB

**Tablets:** I used both an **Apple iPad Mini (Verizon 4G)** and an **Android Google Nexus 7 (WiFi)** this past summer for both Search & Rescue missions and Fire Operations. I found the smaller format of each to be a good size for fires because they fit in the cargo pocket of nomex pants. Having both operating systems has allowed me to download and evaluate mobile applications regardless of operation system.

**iUSBport2 by Hyper +Drive.** This is a great little portable drive that allows me to create a wireless hotspot anywhere and distribute Avenza PDFmaps to resources in close proximity on the fire line and on Search & Rescue operations where cell phone coverage is not available. I have mine set up with a 64gb micro SDXC card to store maps I created using ArcGIS in my vehicle. The iUSport2 works with iOS, Android, laptops and most WiFi-enabled device. Allows file transfer with up to 12 different users at the same time. (You need to use the Safari browser when downloading maps to properly export into Avenza PDFmaps)



**Printers:** I tried using small portable printers but found them less than optimal for my

printing/copying/scanning requirements. I have used HP, Brother and Epson ink jet printers mounted in my vehicle because they have power requirements between 5 watts when idle and 20 watts when printing as compared to 800 watts to 2000 watts for a laser printer. I consider printers to be a consumable item and end up replacing them on a regular basis.

Printers Cont...

*In addition to the ability to print/copy/scan, I found it necessary to be able to manage paper efficiently without it distorting or curling. Having a printer with a flat enclosed paper tray minimizes paper jams and keeps dust out.*

**GPS input:** The **GlobalSat GPS Receiver BU-353 & BU-353S4** receivers provides a GPS signal to my laptops when vehicle mounted. The GPS works well with ArcGIS 10.2.2, Terrain Navigator PRO, GOOGLE Earth and Microsoft Streets & Trips 2013. The drivers are easy to install and work with both Microsoft XP, Win7. Price is about \$40.00



**Network:** The wired/wireless network in my truck is tied to together with a CRADLEPOINT MBR1000 router that uses a Verizon UML290 3G/4G USB Modem to connect to the internet. I have used this particular system for three years and it has proven to be a reliable solution to provide internet access through a WiFi link on non cellular tablets and computers where cell coverage is available. The system also provides a functional local network that allows wireless printing from tablets and phones.



**Cell Booster:** To maximize voice and 3G/4G coverage I utilize Wilson's newest and strongest mobile booster, the Mobile 4G (460108) wireless 50dB cell signal booster with non-magnetic exterior antenna for maximum reception. Booster works with Verizon, AT&T, Sprint, T-Mobile, and most other carriers.



\*\*\*\*\*\*\*\*\*\* **Software: PC** \*\*\*\*\*\*\*\*\*\*

As I embrace tablets and smart phones I remind myself that the laptop computer is still the backbone in my command vehicle. There are many proven applications that support wildland fire operations that I integrate as needed. Below are the ones I use most.

**ArcMAP 10.2.2** I use ArcGIS for Desktop extensively as my primary mapping platform. During the winter I mine GIS data from multiple agencies and then create a backup on portable hard drives. This allows me to mobilize on incidents with my own data sets and not be restricted when cellular coverage is not available. Once at an incident I can usually obtain local updated or proprietary data sets if needed. As ESRI software evolves there are often many reasons to evolve with it. One problem I encounter is the updating of extensions and add-in's does not always keep up with ESRI's releases. To overcome this I maintain two separate computers, one with the latest version and another that works with the legacy version. Add-ins I find most useful are:





**FIMT – Fire Incident Management Tools** [http://gis.nwcg.gov/links\\_tools.html](http://gis.nwcg.gov/links_tools.html)

I have a working knowledge of FIMT and use the basic functions to build field map with standard symbols. I am able to provide field data with proper projections and data structure that allows the GISS to easily update their maps.



**MxGPS -** <http://www.mxgps.com/>

This is an efficient utility that allows for importing and exporting of GPS data between Garmin GPS's and ArcGIS software. I travel with most legacy cables card readers to transfer data.



**DNRGPS:** <http://www.dnr.state.mn.us/mis/gis/DNRGPS/DNRGPS.html>

This is another GPS utility that works well for data transfer. DNRGPS and its predecessor were built to transfer data between Garmin handheld GPS receivers and GIS software. DNRGPS was released as Open Source software with the intention that the GPS user community will become stewards of the application, initiating future modifications and enhancements. Updates often lag behind ESRI releases.



**ALMS – Automatic Lightning Mapping System,** [http://gis.nwcg.gov/links\\_tools.html](http://gis.nwcg.gov/links_tools.html).

I use this extension to import lightning location data into ArcGIS. When used in conjunction with local base maps it provides a better picture of where to position fire suppression resources.



**LANDFIRE Data Access Tool 2.5:** <http://www.landfire.gov/datatool.php>

Provides the ability to easily download and overlay LANDFIRE fuel model and vegetative data directly over base maps when evaluating options for line location or predicting fire behavior.

### Additional Mapping Specific Software



**Google Earth:** <https://earth.google.com/>

As always, this is an incredibly valuable tool when online. Several favorite “My Places” are; [WAFS Wildland Fire Assessment System](#), and The availability to access the COP, (Common Operating Plan) data.



**Terrain Navigator Pro 10.2 for Desktop:** <http://www.terrainnavigator.com/>

Stand-alone editions are \$399 per state, Plus \$124 per year Maintenance

TNP has proven to be a valuable mapping program that is relative easy to master. TNP now has the ability to import and export shp files that allow users to create tracks and points in the field to make real time maps and share the information with the situation unit back at

ICP. TNP continues to add new data layers that improve usefulness, (Public lands, Private lands and Forest Roads). The export function currently is limited to polyline export and you have to use the Feature to Polygon tool to create a polygon in ArcGIS.

I have also been experimenting with the local SAR unit using the new TNP Mobile App for Android and Apple products. Through *Project Synchronization*, markers, tracks, and geopins can be automatically shared between the Terrain Navigator Pro desktop software and the Terrain Navigator Pro mobile app. Synchronization occurs through your mobile app account. Requires the annual subscription.

**Microsoft Street & Trips \$39.95:**

[http://www.microsoftstore.com/store/msusa/en\\_US/pdp/Streets--Trips-2013/productID.253799900](http://www.microsoftstore.com/store/msusa/en_US/pdp/Streets--Trips-2013/productID.253799900)



While a bit out dated and not particularly intuitive, Microsoft Streets & Trips has extensive road information, powerful route planning and plenty of points of interest when navigating off line.



**Franson GPSgate** [http://gpsgate.com/products/gpsgate\\_client](http://gpsgate.com/products/gpsgate_client)

This is as nifty utility that uses a single GPS receiver to create multiple virtual ports to be able to navigate with multiple programs simultaneously. I initially had issues providing GPS signal to more than one program at a time because once I connect to the GPS with a program I typically have to shut down windows to connect with another program or go into device manager and reconfigure the com Ports. . To eliminate that issue I use Franson GPSgate <http://gpsgate.com/> that will allow virtual connections by multiple programs from one GPS input.

**GPS Photo Link:** <http://www.geospatialexperts.com/>



GpsPhoto Link / GeoJot + Core is a program that allows data collection and geo-tagging of photos using a smartphone or GPS enabled camera. GpsPhoto Link can process pictures from mobile phones if the GPS was enabled. You can also synchronize the time stamp in a picture with a waypoint from a GPS if the camera is not GPS equipped.

*On several occasions when the Central Oregon team arrived on a fire I would fly the fire to GPS the perimeter. During the flight I would take geo-tagged photos of the fire behavior and fuels. Once back at the airport or helibase I could post process the pictures in my vehicle and have kmz files available for operations upon my arrival back at ICP to view with Google Earth.*

**Dragon Plot** <http://geodesybase.com/>



My wife works as a lookout and she has been using DragonPlot since the early beta releases. DragonPlot is a three-dimensional terrain visualization software that can plot the location of an incident and providing critical, user defined information about that location. DragonPlot provides a fast and accurate method to plot the location of a newly spotted forest fire and quickly display critical contextual information regarding the location of the fire for dispatch and responding resources.

**GeoSetter:** <http://www.geosetter.de/en/>



GeoSetter is a freeware tool for Windows (XP or higher) for showing and changing geo data and other metadata (IPTC/XMP/Exif) of image files (e.g. images taken by digital cameras). *I use it to geo reference pictures that have erroneous location data*

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## Tablet & Smart Phone Apps



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The current evolution of apps on both Android and Apple platforms reminds me of the early PC days when programmers were independently developing software. Each program had a different feel and structure. Over the past 5 years I have seen wildland fire apps come and go, or not being updated on a timely basis to keep current with policy or changes in publications. The most obvious is the IRPG.

As an end user I hope to see some official portal for the dissemination of applications for wildland fire use that are peer reviewed , up to date and standardized across both Apple & Android platforms.

I use the 10 Standard Firefighting orders as an operational guide when trying to figure out when and where mobile applications have a roll on the fireline. I break down the 10 Standard Firefighting orders in to the three components, The Fire / Fireline Safety / Organizational control. Below are some of the applications I utilize during fire assignments to help me keep informed.

### Standard Firefighting Orders

#### The Fire

- Keep informed on fire weather conditions and forecasts.
- Know what your fire is doing at all times.
- Base all actions on current and expected behavior of the fire.

#### Fireline Safety

- Identify escape routes and safety zones and make them known.
- Post lookouts when there is possible danger.
- Be alert. Keep calm. Think clearly. Act decisively.

#### Organizational Control

- Maintain prompt communications with your forces, your supervisor, and adjoining forces.
- Give clear instructions and insure they are understood.
- Maintain control of your forces at all times.

#### Engagement

- Fight fire aggressively, having provided for safety first.

### The Fire: Weather & Fire Behavior

I usually make contact with the FBAN and IMET if available to obtain the current Fire Weather Forecast. I access NOAA's Western Region Fire Weather Portal <http://www.wrh.noaa.gov/firewx/main.php> which I use throughout the day to compare the predicted conditions with actual weather. The NOAA site has many useful links to fire specific data sets and forecasts. All smart phones with browser capability can take advantage of this site.



### Fire Weather



iOS versions are expected to be released soon

<http://firecenter.umn.edu/content/weather-app>

I use this app to calculate RH, Fine Dead Fuel Moisture (FDFM), and Probability of Ignition (PIG) based on standard fire line weather observations. The ability to archive and share observations to others via email or SMS as text, CSV or KML files is a plus. I would find an individual that has a smartphone to post a lookout to watch the fire and take weather so they can use this app to calculate and distribute fire WX on fires. Calculated outputs compared favorable with manual methods using charts.



### Wildland Toolkit



[Peakview Software LLC](http://www.peakviewsoftware.com)

This is a great one stop app for fire line personnel. The fire weather and fire behavior calculators are quick and easy to navigate. The numerous reference guides and tables provide checklists,



safety information, ICS structure and other reference materials for wildland firefighters  
**Fireline Safety / Mapping**

Having good maps and being able to update them as conditions change on the fire line is critical to identifying safety zones, Escape Routes and making them known. I often access maps in the **incident specific data** directory located at <ftp://ftp.nifc.gov/>. Not only are the IAP and briefing maps available there are often geo-referenced PDF Infra Red maps with the latest hot spots and fire perimeter.



**AVENZA PDFMaps**



<http://www.avenza.com/pdf-maps>

The PDF Maps app is a geospatial PDF, GeoPDF® and GeoTIFF reader for Apple iOS and Android smartphones and tablets. Interact with spatially referenced maps to view your location, record GPS tracks, add place marks, and find places.

*This is unquestionably the easiest app to deploy and use on a going fire. This last summer I was able to build maps using ArcGIS 10.2.2 export them as pdf's, then either mail them or transfer the file using a USB cable or iUSBport WiFi to individuals on the fireline. I have used both the Apple and Android versions on my iPad Mini and Google Nexus 7 without any issues.*



**Google Earth:**



<https://earth.google.com/>

As always, this is an incredibly valuable tool when online.



**Terrain Navigator Pro App**



<http://www.terrainnavigator.com/>

Terrain Navigator Pro (TNP) provides an affordable and simple solution for professionals to collect and seamlessly transmit data from the field to the office. Use the TNP mobile app to map, find, collect, and share field data. Then, with a mobile connection, instantly share field data with the TNP desktop software to analyze GPS and GIS data at the office. TNP serves a professional market, including search and rescue teams, law enforcement, foresters, surveyors, the oil and gas industry, and land managers. This mobile app is ideal for entry-level GIS applications and enables professionals to use the smart phone in their pocket instead of a consumer-grade GPS device (like a Garmin, Magellan or Delorme). To activate this app, users need a licensed copy of the Terrain Navigator Pro desktop software version 9.2 or later.

*I have recently started using TNP during Search and Rescue training to test the functions and suitability for collecting and up loading data to a command center. First impressions is it work well but is dependent on cell coverage for near real time updating (approx 5 min intervals)*

**Trimble Outdoors Pro \$4.99 Plus in App Purchases for maps** <http://www.trimbleoutdoors.com/>



With Trimble Outdoors, consumers can use their GPS-enabled cell phones to navigate trails and highways, track their fitness performance, and create, manage and share those experiences with others.

*Trimble Outdoors (Navigator) appears to be a standalone navigation program with the same look and feel as Terrain Navigator PRO Desktop with Tablet App. You can purchase off line*

maps The price for a typical county topographic map is \$19.99, States are \$69.99.



#### Peak Finder \$3.99



<http://www.peakfinder.org/mobile/>

This is a handy utility that allows me to identify peaks when in areas that I am unfamiliar with. PeakFinder USA West includes more than 30'000 peak names. The application contains a complete topographic model of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North and South Dakota, Oregon, Utah, Washington and Wyoming. PeakFinder shows the names of all (most) mountains and peaks with a 360° Panorama display. This functions completely offline - and everywhere!

*I find this useful in identifying radio repeater and lookout sites in areas I am unfamiliar with.*



#### OSHA Heat Safety Tool, US Dept of LABOR



[https://www.osha.gov/SLTC/heatillness/heat\\_index/heat\\_app.html](https://www.osha.gov/SLTC/heatillness/heat_index/heat_app.html)

The App allows workers and supervisors to calculate the heat index for their worksite, and, based on the heat index, displays a risk level to outdoor workers. Then, with a simple "click," you can get reminders about the protective measures that should be taken at that risk level to protect workers from heat-related illness-reminders about drinking enough fluids, scheduling rest breaks, planning for and knowing what to do in an emergency, adjusting work operations, gradually building up the workload for new workers, training on heat illness signs and symptoms, and monitoring each other for signs and symptoms of heat-related illness.



#### ERG 2012 Emergency Response Guide, US Dept of Transportation



<https://play.google.com/store/apps/details?id=gov.nih.nlm.erg2012>



<https://itunes.apple.com/us/app/erg-2012-for-iphone/id592158838?mt=8&ign-mpt=uo%3D2>

The Pipeline and Hazardous Materials Safety Administration has developed a free, mobile web app of its Emergency Response Guidebook 2012 (ERG). The new safety tool provides the nation's emergency responders with fast, easily accessible information to help them manage hazardous material incidents. This software is available from the Apple iTunes store for iPhone, and from the Google Play website for Android.

## UTILITIES – Communication

Applying mobile technology and being able to communicate from the field back to ICP and on the fire adds another challenge to what is usually a dynamic situation for me as a DIVS. Below are several Applications I have used to try to identify locations where cell coverage is available. This summer I noticed a significant decrease in bandwidth speed as more users arrived on the fire. This was evident even when a strong cell signal could be acquired.



### **SENSORLY**



<http://www.sensorly.com/>

As a crowd sourced service, Sensorly gathers anonymous data from all its users willing to share their experience as carriers' clients. The aim is simple: provide the greater number with unbiased information on wireless networks performance worldwide, based on real data, and translate them into coverage maps for all to see. *You can check actual coverage on your smart phone using the app or just check their website [www.sensorly.com](http://www.sensorly.com) and select the COVERAGE MAP tab where you can chose for most carriers and view maps of coverage.*

*I start Sensorly on each incident and Sensorly measures the signal type and strength and provides an updated map by the end of shift of new hotspots where I get cell phone coverage.*



### **OpenSignal** <http://opensignal.com/>



*Is another crowd sourcing application that tracks real time signal quality. You can find better signal and free Wi-Fi. Compare network coverage and speeds. Test your performance and share the results. Track your data usage and signal quality. Understand how your network is really working for you.*

*On several occasions I have been in situations where I am in a spike camp and have to receive a "radio briefing" because driving the distance from the ICP would not be practical. As more dependable internet links become established there is an opportunity to have video conferencing or use social networking applications like FACETIME or SKYPE to deliver this information.*



### **Skype**



<http://www.skype.com/en/download-skype/skype-for-tablet/>

Skype has the potential to be a valuable communication tool for sharing information on incidents. Users can video chat and voice calls from computers, tablets and mobile devices via the Internet to other devices or telephones/smartphones. Skype is available to download onto computers running Microsoft Windows, Mac or Linux, as well as Android, Blackberry, iOS and Windows Phone smartphones and tablets.



### **FaceTime, By Apple**



<https://www.apple.com/ios/facetime/>

FaceTime allows you to effortlessly video chat or talk with anyone on an iPad, iPhone, iPod touch, or Mac with a built-in FaceTime camera.



## UTILITIES – QR / Print / Scan



### QR Code Reader <https://scan.me>



I am currently using the QR reader from Scan with good success. It is simple and stores the history of QR codes you have accessed.



### EPSON iPrint



<http://www.epson.com/cgi-bin/Store/jsp/epson-connect/mobile-printing/iprint-app.do>

Print anytime, anywhere to Epson printers from your Android or Apple phone or tablet. You can print photos, webpage and files including Microsoft® Word, Excel and PDF documents. You can even scan, save and share your files. Also supports online file services such as Box, Dropbox, Evernote®\*2, Google Drive and Microsoft SkyDrive. Epson iPrint makes printing easy and convenient whether your printer is in the next room or across the world.

*\* I have use Epson iPrint with a EPSON XP-800 and EPSON ARTISAN 810 printers in my vehicle and at my wife's remote lookout. The Android version requires a EPSON Print Enabler for newer versions 4.4 or late that can be downloaded from the Google Play Store. Using this I can print form most of all my applications that have a print function. Not all Epson wireless printers appear to be supported.*



### Brother iPrint&Scan



<http://www.brother-usa.com/connect/mobile/ios.aspx#.VGudmfnF9mw>

Brother iPrint&Scan is a FREE app download for printing from and scanning to your Apple iPhone, iPad and iPod touch through a wireless network. It automatically find compatible printers, all-in-ones and scanners on your network, Wirelessly print JPEG, PDF, Web Page, Word, Excel, and PowerPoint files. Print files using Brother iPrint&Scan via iTunes File Sharing. Scan, store and share files via your photo album, iCloud or e-mail. Print copied images or text in a screenshot format via clipboard print. Print files from your Dropbox, GOOGLE DRIVE™, ONEDRIVE and EVERNOTE accounts.

## UTILITIES – Camera



### Lapse It • Time Lapse • Pro: \$1.99 by Interactive Universe



<http://www.lapseit.com/>

This utility allows you to set your smart phone up to capture pictures at a user defined interval. Then you can render a video to play back at user defined frames per second to create a time lapse video. The pro version allows you to imbed time stamps and define several higher resolution output videos.

*My wife works on a lookout and I have been able create short videos of the fire behavior from small fires in her area. I have an old smart phone without a data plan that I use off line to capture pictures then transfer the rendered video via USB cable to my computer.*



### Google Camera By Google Inc



<https://play.google.com/store/apps/details?id=com.google.android.GoogleCamera&hl=en>

Google Camera captures quick and easy photos and videos, and takes advantage of your Android device's computing power with image enhancing features like HDR+, Lens Blur, Wide Angle, Panorama and **Photo Sphere** to create amazing 360° Photo Sphere, panoramas, wide angle and fisheye image captures with Google's photo stitching technology developed for Google Maps Features. Photo Sphere and Panorama require a gyro sensor.



### Photo Sphere Camera, By Google Inc



<https://itunes.apple.com/us/app/photo-sphere-camera/id904418768?mt=8>

Description: Note: the iPhone 4 cannot create photo spheres.

Create beautiful 360° images and publish them on Google Maps. At up to 50 megapixels, these high-resolution photo spheres let you to look up, down and all around to revisit the amazing places you've been — and share them with anyone. Outdoor enthusiasts: from mountain top vistas to towering forests, Photo Sphere Camera helps you easily share 360° views of the great outdoors. Add your photo spheres to Google Maps to help others explore the world and make more informed travel decisions.

*I had to download this app on my computer then sync with the iPadMini. to get this app to work running iOS v8.1.1*

## Applications I have loaded in the past but no longer use:



### Wildland Fire Tools (Outbreak Apps) *(some links are broken and IRP is out of date)*



[https://play.google.com/store/apps/details?id=com.v1\\_4.B252FED8B0365659AEC3420F.com&hl=en](https://play.google.com/store/apps/details?id=com.v1_4.B252FED8B0365659AEC3420F.com&hl=en)

This app combines a suite of tools to quickly and easily access commonly accessed information; Fire Orders, Watchout Situations, Size up, Briefing Checklist, IRPG, Fireline Handbook, Fireline Handbook App. B, Firescope, FOG, Weather Links, and more. User needs to download all PDF's while in cell range or wifi.

*Website indicates that this version will soon have limited functionality. Please upgrade to the Pro Version. The Pro Version not available through Google Play Store but can be found by searching for wildlandfiretoolspro.apk, When started to install the application I was prompted to accept other applications before the process would proceed*



### IRPG-Full - Wildland FireFighter (SpotFire Ent). **IRPG currently not updated**



<https://play.google.com/store/apps/details?id=com.robb.sf.irpgrobb.irpg&hl=en>



The intent of this guide is to provide a wildland fire job aid and training reference for operational personnel from Firefighter Type 2 through Division Supervisor and initial attack/extended attack Incident Commanders. It also has a secondary application for all-hazard incident response." This app has NO ads, NO permissions and requires NO network connection once installed. This app is menu driven. This app is true to the form of the hard copy pocket guide. This app contains an RH Calculator. The RH Calc is also available as a separate, free, small and lightweight app for your quick access if you are posted as a lookout.



### BASIC RELATIVE HUMIDITY CALCULATOR (SpotFire Ent) (Free)



<https://play.google.com/store/apps/developer?id=SpotFire+Ent.,+l.c.&hl=en>

*Developed for you by SpotFire to make life a bit easier for wildland firefighters.*

This is a basic Relative Humidity Calculator, enter Fahrenheit and Feet for your units. Input your Air Temp, Wet Bulb Temp, and Elevation and mash the button, your RH Value as a percentage will appear on the screen. This app has NO ads, NO permissions and requires NO network connection once installed. The RH CALC is also available in the SpotFire IRPG and SpotFire IRPG-FULL

*I have replaced this with Wildland Fire Weather from .UM*



### FieldNotes LT



<http://mobileworldsoftware.com/>

FieldNotesLT is the light version of the FieldNotes application. It is cut down to the bare essentials that many professionals and students find important in their work. This version of FieldNotes provides GPS location with three different types of maps, it can handle unlimited numbers of notes, and can email many notes at a time as KMZ files. It automatically geo-references all images taken from within the note, and can easily send a zipped folder of these images via email. FieldNotesLT is the perfect option for those who don't need more than the basic options to email their brief notes and images.

FieldNotes Pro is the perfect app designed for the working professional. It has many features that are not included in the FieldNotesLT application.

*Field Notes has some great features that I may explore In the future But for now I use the features in AVENZA to capture and email data.*



**Signal Check** by Blue Line Computing



<http://www.bluelinepc.com/signalcheck/>

SignalCheck is a Android app that allows users to check the true signal strength of their connections. Unlike the standard Android signal bars, which only display the 1xRTT (voice and low-speed data) signal strength, SignalCheck shows detailed signal information about all of your connections, including 1xRTT, GSM, EV-DO or eHRPD (3G), LTE (4G), and WiFi.



**Signal Finder** by AKVELON



<http://www.akvelon.com/mobile-technology/akvelon-signal-finder>

Akvelon Signal Finder is a client-server mobile application which shows the nearest cell tower locations and GSM/CDMA network signal strength. The towers are displayed on a map along with directions to the areas with the best cell reception. The application runs in the background, collecting signal strength data to improve the quality of information available to users. The application requires Android 1.6 and up.



**NETWORK SIGNAL INFO PRO**, Kaibits Software,



[http://www.kaibits-software.com/product\\_networksignal.htm](http://www.kaibits-software.com/product_networksignal.htm)

Network Signal Info Pro provides detailed information on your currently used network, regardless whether you are using WiFi or a cellular connection. The Pro version has a NEW cell tower database with more than 22 million entries, a NEW MOBILE SIGNAL TRACKER function that generates a KML file for use with Google Earth, and much more